



Review

Moving forward with strengthening routine immunization delivery as part of measles and rubella elimination activities

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ABSTRACT

The Global Vaccine Action Plan includes a goal of meeting global and regional measles and rubella elimination targets, noting that such efforts should not operate in silos but be coordinated with other immunization efforts. Similarly, the Global Measles and Rubella Strategic Plan for 2012–2020 emphasizes the need for integrated approaches to achieve and maintain very high levels of population immunity using both routine immunization and supplemental immunization activities (SIAs). The strategic plan also includes routine vaccination coverage targets, highlighting the critical role of strong routine immunization systems as a cornerstone for sustainable measles control/elimination efforts. It encourages exploiting the resources and visibility of SIAs to strengthen routine immunization, thereby reducing the frequency with which SIAs are needed. Documented examples of doing so include training health workers, procuring cold chain equipment, and improving injection safety and adverse events management. However, the concept has been put into practice only to a limited extent and missed opportunities persist regarding this aspect of SIA planning and execution. This paper draws on recent studies of the interaction between measles activities and health systems as well as country experiences in using SIAs to strengthen routine immunization. It identifies obstacles and enabling factors to doing so and proposes options for systematically strengthening routine immunization as part of a best practice SIA.

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1. Introduction

The endorsement of the Global Vaccine Action Plan (GVAP) by the World Health Assembly in May 2012 validated several existing initiatives in immunization. Among the GVAP's five goals is to meet global and regional elimination targets for diseases, emphasizing that efforts should be made to “ensure that global vaccination

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programs focused on eradication and elimination goals (for example, poliomyelitis and measles campaigns) do not operate in silos.” The GVAP further states that the specific mechanisms by which interaction and coordination among programs can be promoted varies by local contexts [1].

The endorsement of the GVAP closely followed the release in April 2012 of the Global Measles and Rubella Strategic Plan for 2012–2020 [2] by the Measles Rubella Initiative (MRI Initiative¹). This plan lays out goals and milestones for achieving measles and rubella elimination in at least five of the six World Health Organization (WHO) regions by 2020. The first of the five core components of the strategy is to achieve and maintain high levels of population immunity by providing high vaccination coverage with two doses of measles- and rubella-containing vaccines. Consistent with the GVAP, the Global Measles and Rubella Strategic Plan situates measles elimination within the broader health system context: its guiding principles include using measles elimination activities, including supplemental immunization activities (SIAs), to strengthen routine immunization and equitably provide other proven health interventions to a wide target group. The Strategic Plan points out that SIAs can and should help strengthen routine immunization systems through renewed attention to core components of program management such as microplanning, health worker training, and reinforcement of the cold chain [2].

In theory and in practice, this approach to measles elimination confers mutual benefits. In 2008 alone, measles SIAs in 17 African countries provided over 57 million doses of vitamin A supplements, 24 million doses of deworming medication, and 3.4 million insecticide-treated nets [3], thereby supporting multiple health programs. This approach, in turn, generates support from country governments and donors for future SIAs and measles control activities. The relationship between SIAs and high routine immunization performance is important in epidemiologic terms. Achieving and maintaining high levels of timely routine measles immunization is central to reducing measles transmission [4] and accounts for two thirds of all measles deaths averted [5]. Maintaining high levels of routine immunization coverage each year reduces the accumulation of susceptible populations, thereby lengthening the interval needed between SIAs and conceivably eliminating the need for them altogether if validated routine coverage with two doses of measles vaccine were to exceed 90–95% for at least three consecutive years [6].

While SIAs and routine immunization share the goals of averting vaccine-preventable diseases, they differ in operational ways. Routine immunization aims to attain high coverage for all doses of vaccine in a national immunization program through ongoing (daily, weekly, monthly) fixed and outreach services to specific target groups, often children under one year of age and women of childbearing age. Routine doses are recorded and used as the basis for annual national estimates of coverage. By contrast, SIAs aim to reduce transmission of a particular disease by temporarily administering vaccine to an expanded age or target group through fixed, outreach, and door-to-door services and an expanded network of vaccination posts. Also unlike routine immunization, SIAs are conducted intermittently with timing determined by disease epidemiology and routine immunization performance; and SIA doses are not captured in annual estimates of immunization coverage. Also in contrast with routine immunization, SIAs are high visibility events that attract much attention to immunization.

Current evidence suggests that SIAs can and often do contribute to strengthening routine immunization systems but cautions

against potential negative impact, especially in countries with weaker health systems [7]. However, despite many years of discussion and development of frameworks and tools on how to use the opportunities of SIAs to strengthen routine immunization and reduce potential disruptions of SIAs to routine services [8–13], there is limited documentation of the systematic application of such tools in planning and executing SIAs. In 2011, WHO undertook a program to identify opportunities and practical ways in which countries can use activities focused on controlling or eliminating measles to also strengthen routine immunization and surveillance system performance for the mutual advantage of both efforts. Findings from this work, described below, that are relevant to strengthening routine immunization will serve as the basis for a guidance document for countries to use in planning, implementing, and monitoring their SIAs.

2. Materials and methods

The objective of the work described here is to prepare practical guidance for countries in low resource settings to use in planning SIAs in ways that systematically and strategically contribute to the strengthening of routine immunization. A mix of methods was used to develop this guidance. In addition to examining findings from a recent series of studies on the interaction between accelerated measles activities and health systems, we examined existing regional and country SIA guidelines, SIA reports and related documentation to identify potential operational actions and processes that could be incorporated into SIA planning without overburdening health officials already engaged in labor-intensive SIA preparations. Interviews were conducted with individuals engaged in country-level research and implementation currently under way in Ethiopia, Jharkhand State of India, and Nepal on using SIAs to bring about improvements in routine immunization.

To supplement the information from the above sources, we carried out field work in 2011 in two countries to learn the perspectives of health officials at national, subnational, and facility level regarding using measles activities to strengthen routine immunization for vaccine preventable diseases. The field work was conducted in the Lao Peoples Democratic Republic (Laos) and Bihar State of India in settings with suboptimal coverage for a first dose of measles-containing vaccine (MCV1) and where measles or measles-rubella SIAs were planned or recently conducted. At national level, in-depth interviews and discussions were carried out with immunization officials and development partners who support immunization. Visits were made to a purposeful sample of relatively accessible health districts and facilities representing a mix of urban and rural settings and higher and lower levels of routine immunization coverage for MCV1 and a third dose of diphtheria-tetanus-pertussis containing vaccine (DTP3) (Table 1). Interviews were carried out with district health teams in 8 districts and healthcare providers at a total of 15 health facilities.

Qualitative methods of inquiry [14] were used to elicit the views of country level stakeholders, planners, and implementers of SIAs regarding approaches, specific activities, and feasibility of using SIAs to strengthen routine immunization. Semi-structured interviews [15] were conducted to explore the perspectives of managers and frontline health workers.

Pretesting of the interview instruments in an initial district revealed that in some sites, the concept of taking advantage of SIAs to benefit routine immunization was too unfamiliar, abstract and hypothetical for respondents to be able to respond in a meaningful way. Interviewers revised the technique to relate the questions to respondents' personal experience with other recent SIAs involving injectable vaccines. Respondents were asked to contrast the SIA experience with the management of routine immunization

¹ The leading partners in the Measles Partnership are: American Red Cross, United Nations Foundation; U.S. Centers for Disease Control and Prevention (CDC), UNICEF, and the World Health Organization (WHO).

Table 1
2010 DTP3 and measles coverage in field work sites, India and Laos.

Country	Province or state visited	District visited	2010 Measles coverage (%)	2010 DTP3 coverage (%)
India	Bihar	Gaya	65	74
		Nalanda	72	85
		Saran	84	90
		Vaishali	87	85
Laos	Vientiane	Feuang	74	86
		Salavan	62	74
		Paukaut	74	85
		Pek	53	59

Data sources – Laos: administrative data; India 2010–2011 Annual Health Survey.

The revised interview discussion guide addressed the following topics: current coverage for routine immunization and challenges to increase it; previous experience with SIAs against measles or tetanus; program actions for SIAs that differed from routine immunization; how and why the SIA-specific activities were useful; SIA-associated activities that could contribute to addressing the challenges to routine immunization; feasibility of carrying out these activities; types and levels of resources required; and how SIAs could be used to improve the recognition and reporting of vaccine-preventable diseases, particularly measles and rubella.

The above approach resulted in productive discussion that generated ideas among respondents for possible SIA activities to strengthen routine immunization. These activities, in turn, served as the basis for exploring their potential contribution to improving routine immunization and the feasibility of implementing them before, during, and after SIAs.

3. Results

3.1. Challenges to strengthening routine immunization

Commonly-cited challenges identified from field work included: difficulty in accurately estimating target populations, absence of detailed plans for routine immunization, low turnout for outreach sessions, infrequent services at fixed facilities, insufficient human resources for routine immunization, insufficient resources for cold chain and logistics management, limited capability in vaccine forecasting, limited ability of health workers to counsel caregivers on the effectiveness and safety of immunization; low population demand; and competing priorities faced by caregivers (i.e., income generation rather than seeking vaccination services).

3.2. Unique attributes of SIAs that contribute to their effectiveness

When asked about the differences between routine immunization and SIAs, respondents in both countries characterized the SIAs as having enhanced interdepartmental and multisectoral coordination; involvement of civil society entities not usually involved in routine immunization; support from political officials with authority to stimulate action at national, state, district, and local levels; proactive communication efforts, both interpersonal and mass media; development of detailed implementation plans; enhanced monitoring and supervision before and during the SIA that is lacking in routine immunization; and increased levels of per diems for health workers and volunteers to conduct immunization activities.

3.3. Proposed SIA-related activities to strengthen routine immunization

The field work in Laos and India yielded several potential activities that could be conducted in conjunction with SIAs to improve

routine immunization. These were discussed, expanded upon, and informally assessed for feasibility and importance during a one-day meeting of experts in measles SIAs and routine immunization from multiple agencies convened by the American Red Cross in September 2011. A small subset of potential activities identified during field work and the meeting is shown in Table 2.

During field work, discussion of the proposed activities highlighted the fact that some of them require pre-SIA preparation while others entail post-SIA follow-up in order to realize lasting benefits for routine immunization systems. Probing during interviews revealed that some proposed activities require substantial human and financial resources while others have no or very minor financial implications. An example of the latter is to discuss the status of routine immunization compared to SIA performance during post-SIA meetings with local community and political leaders in order to encourage them to promote and support routine immunization.

3.4. Selection of SIA activities to address country challenges to routine immunization

The field work underscored the fact that just as certain features of SIA planning vary by country situation (e.g., target age group or duration of SIA), there is also variability regarding the challenges to improving routine immunization. In some facilities visited, for example, cold chain equipment procured for previous SIAs was available but the fuel to operate it for routine immunization was not. In such circumstances, a global recommendation for SIAs to procure additional cold chain equipment would not serve to strengthen routine immunization, while the provision of fuel to run it for routine immunization following the SIA would fall outside of the SIA budget. This situation highlights the need for country-level immunization officials to determine which SIA-associated activities would contribute most usefully to strengthening routine immunization in their settings and to align those activities with the priorities in national multiyear and annual immunization plans.

3.5. Perceived obstacles to using SIAs to strengthen routine immunization

While most people interviewed were, in principle, supportive of the concept of using the opportunities afforded by SIAs to strengthen routine immunization, they spontaneously described obstacles to implementing this line of work, including:

- Lack of priority, mandate, or objectives on strengthening routine immunization as an integral part of SIAs or as a valid measure of the success of an SIA;
- Limited advocacy or deliberate effort on the part of stakeholders, including government and development partners, to identify potential opportunities and resources and to guide state or

Table 2
Subset of illustrative SIA-associated activities to strengthen routine immunization.

Program area	Possible SIA-associated activities to strengthen routine immunization	When to implement: before/during/after SIA
Planning	Build planning for routine immunization strengthening into all phases of SIA planning (e.g. workshops, tools) Use SIA head counts to revise target population for routine immunization microplans Use information on costs of reaching hard to reach during SIAs to revise routine immunization budgets	Before After After
Training and supervision	Conduct needs assessment and include key topics to reinforce routine immunization skills in SIA training	Before
Monitoring and evaluation	Use findings from SIA supervision checklists to correct deficiencies for routine immunization Provide feedback to local community and political leaders on both SIAs and routine immunization Apply findings from Rapid Convenience Assessments on source of information to routine immunization communication strategies	After During/After After
Communication/social mobilization	Provide key messages to caregivers on need to return for routine immunization and when (if possible) Foster strong relationship with media for accurate, supportive coverage of routine immunization	During After
Vaccine supply management	Following SIA, physically inventory and redistribute vaccine stocks	After
Cold chain/logistics	Update inventory, distribute new equipment to meet needs for SIA and routine immunization Use data on cold chain/logistics problems identified during SIA as basis to correct for routine immunization	Before After
Surveillance	In SIA training, reinforce health worker skills on measles case detection and reporting	Before

district program managers on how to use the SIA to strengthen routine immunization;

- Insufficient financial resources to carry out the activities for strengthening routine immunization that they, themselves, had suggested;
- Lack of time and human resources to take on additional activities, especially in light of the intensity of planning that SIAs already require;
- Lack of clarity regarding responsibility for specific tasks in this area during SIA preparation, implementation, and follow-up;
- Absence of a follow-up plan on how resources obtained for the SIA could be used for routine immunization at a later date. For example, field work in Bihar indicated that while during SIAs, most health centers had kits for adverse events following immunization (containing injectable adrenaline, hydrocortisone, analgesics, saline, and supplies for administering these medications), the kits were not replenished for use in routine immunization.

In addition, health officials and frontline healthcare providers expressed concern that while community leaders could be mobilized for SIAs, they would be unapproachable and moreover lack the interest or incentives to support routine immunization.

3.6. Findings from related work

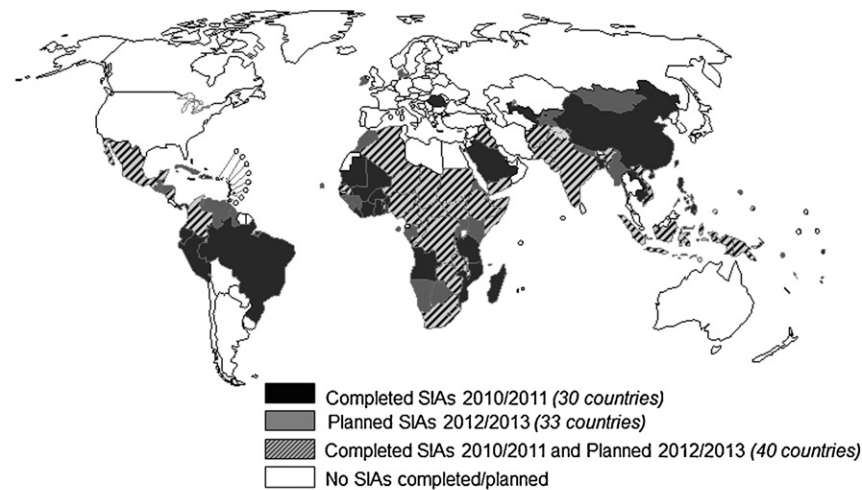
The findings from the field work are consistent with patterns emerging from related work in Ethiopia, Jharkhand State (India), Nepal, and Cote d'Ivoire and recent multi-country studies on the interface between measles elimination activities and health systems. In the area of capacity building, SIAs have provided training to reinforce health worker skills that are applicable both to SIAs and routine immunization. This training has been most efficient and effective when based on a needs assessment that identifies specific skill deficits, for example, vaccine management and forecasting. In some cases those skills have dropped off in the absence of post-SIA reinforcement. With regard to improving planning, SIAs have improved the identification of hard to reach populations but the extent to which that information is incorporated

into microplans for routine immunization that are subsequently implemented appears mixed. For social mobilization and communication, health workers have in some places used SIAs to convey information to communities and local leaders about the importance of routine immunization and continued such discussions post-SIA through channels identified during SIA planning. Elsewhere, the failure to include this activity in SIA checklists and post-SIA evaluation tools has been given as the reason for not taking action. The use of monetary incentives for health workers and mobilizers during SIAs is crucial to achieving very high levels of SIA coverage. However, as similar incentives are not usually available for routine immunization, health workers may be less motivated to conduct routine immunization activities. In India, this issue has been resolved by providing incentives to mobilizers for routine immunization to motivate them to get children to session sites, get each child fully immunized, and also complete booster doses.

Consistent with the findings of our field work, these findings indicate that active post-SIA follow-up is needed to realize the potential benefits of SIAs to routine immunization. For example, use of maps or microplanning methods introduced as part of SIA preparation may require continued attention post-SIA to serve the purposes of routine immunization strengthening. Relevant information from SIAs must be captured in routine immunization planning, training, supervision, communication, monitoring, and management documents and functions. Starting with a post-SIA review and handover process, clear assignments of responsibility are needed, along with identification of resources for implementation.

4. Discussion

Measles continues to be a critical health challenge that requires ongoing attention and multiple service delivery strategies to achieve consistent, timely, and uniformly-high levels of population immunity. Intensified efforts from 2000–2010 succeeded in achieving both an increase in global MCV1 coverage from 72% to 85% through routine immunization services as well as the vaccination of approximately 1 billion children through measles SIAs. From 2000 to 2008, measles-related deaths fell from an estimated



Source: WHO/UNICEF coverage estimates 2011 revision. July 2012

Fig. 1. Completed and planned measles SIAs, 2010–2013.

733,000–164,000 deaths [16]. In the Africa region, however, the reductions by 93% and 91% in measles cases and measles-related mortality, respectively, was followed by a resurgence of confirmed outbreaks in 61% of countries in the region, despite reported high levels of MCV1 and SIA coverage [17,18]. Investigations indicated that non-vaccination (either through routine immunization or SIAs) was the major reason for outbreaks, with vaccine unavailability, delays in vaccination, lack of understanding of importance of immunization, and unwillingness among certain religious groups to permit vaccination of their children as underlying causes [17,19].

This experience highlights the importance of making the most effective use possible of complementary service delivery strategies to prevent measles, particularly in settings with limited infrastructure and human resources. The relationship between specific disease control initiatives in immunization and broader health system strengthening efforts has been debated for decades. Concerns that disease-specific SIAs displace resources for routine immunization have been countered with contentions that disease control initiatives build concrete capacity in health management while achieving rapid, tangible improvements in targeted health outcomes [8–10,20–22]. As noted elsewhere [3], this question is not unique to immunization and extends to other areas of health [23–26]. Such debates have given rise to broad proposals of approaches for finding common ground [27–29] as well as the development of tools specifically for immunization [11,12,30].

The potential of measles SIAs to strengthen routine immunization has been established and mutually productive opportunities identified. For example, SIAs are known to reach substantial sub-populations of poor children previously missed by routine immunization [31], indicating that SIA planning can yield useful information that fits squarely within the Reaching Every District approach widely used for routine immunization planning [32]. Injection safety practices and the management of contaminated needles and syringes have improved due to deliberate SIA planning efforts coupled with resources from the GAVI Alliance [33,34], leading to long-term advances in these areas. Post-SIA reports submitted to WHO require that countries describe SIA activities to strengthen routine immunization. The most frequently cited activities pertain to upgrading the cold chain and reinforcing health worker skill through training, particularly in the management of adverse events following immunization and vaccine management.

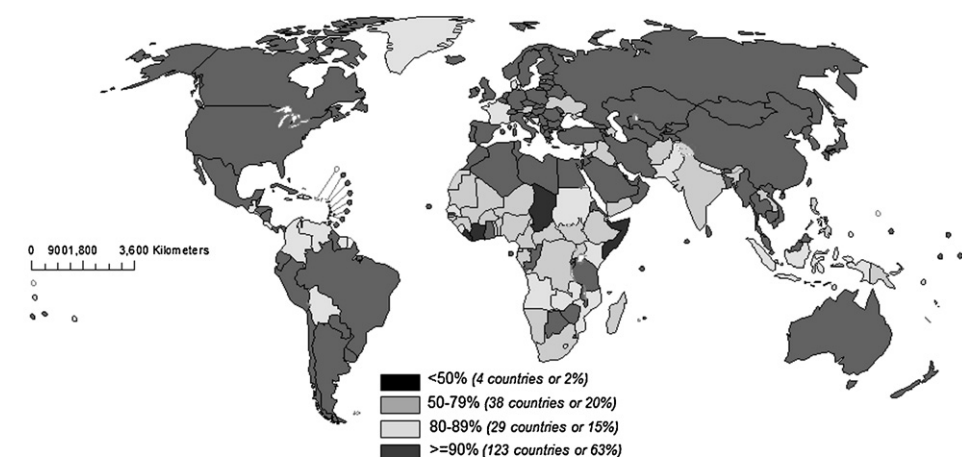
These observations have been supported by findings of recent studies in six countries on the impact of measles elimination on routine immunization and health systems [7,35], the latter defined

by the World Health Organization as consisting of all the organizations, institutions, resources and people whose primary purpose is to improve health [36]. In addition to the areas mentioned above, positive impacts of SIAs included enhanced cross-sectoral coordination and collaboration for the duration of the SIA; better data on underserved populations and improved capability to reach them; and increased community awareness on the benefits of immunization [7]. Preliminary and emerging findings from work under way in Ethiopia [37], Nepal, Jharkhand State of India, and Cote d'Ivoire also suggest SIA-related improvements to routine immunization in these areas but indicate the need for continued and direct attention to maintain them over time.

SIAs continue to be prevalent in countries where coverage for MCV1 and other antigens is suboptimal (Figs. 1 and 2). However, it is in these same settings with relatively weaker infrastructures that SIAs are more likely to overburden the health system [7]. Attention is needed to both reduce SIA disruptions to health systems and take deliberate, strategic advantage of the potential synergies between SIAs and routine immunization strengthening [38].

With the growing recognition that strong routine immunization systems are essential for the successful use of new vaccines as well as attainment of disease control goals, support for the concept of strengthening routine immunization systems is increasingly evident in policies and strategies. The World Health Assembly endorsement of the GVAP calls for a strong focus on strengthening routine immunization [1], while the measles elimination strategy for Africa, adopted in 2011 by WHO Regional Committee for Africa, states that measles elimination activities should be implemented in ways that strengthen immunization systems [39]. Recently updated standard guidelines for measles SIAs in the Africa region of WHO have added a section on using SIAs to strengthen routine immunization [40]. India's guidelines for Measles Catch-Up Campaigns [41] consistently underscore the need to avoid disruptions to routine immunization services and provide guidance on using SIAs to benefit routine immunization. In Ethiopia, routine immunization strengthening was a core component of the 2010–2011 nationwide “best practice SIA” – that is, an SIA comprised of activities that are appropriate to the local context, known to lead to predictably good results, and not requiring excessive resources [37]. In the Americas, strong routine immunization performance has always been a core component of measles and rubella elimination strategies [42,43].

Findings from our field work as well as information emerging from related work suggest that while SIA planners and



Source: WHO/UNICEF coverage estimates 2011 revision, July 2012

Fig. 2. Coverage in infants with first doses of measles-containing vaccine, 2011.

implementers can, upon questioning, propose SIA-related activities to improve routine immunization, they spontaneously describe practical impediments to transforming the ideas into action. These obstacles include: insufficient financial resources; concern that additional activities would detract from primary SIA responsibilities and are not relevant to SIAs; absence of attention to this area in SIA planning, monitoring, and evaluation tools; and lack of political or technical support. The concerns of country-level managers and frontline health workers are vital to shaping feasible practices at operational level as ultimately these personnel are in a position to adopt or overlook practices recommended at global and regional level [44,45].

Country-level monitoring is needed to track the contributions of SIAs to routine immunization strengthening and build accountability for this aspect of SIAs. It would be desirable to aggregate country data on a given indicator at higher levels. However, the variation among countries regarding which SIA-related activities would be most useful for strengthening routine immunization precludes reliance on a single universal indicator. Instead, we propose a combination of a global level indicator and a country level process indicator. The former could describe the preparation of a funded plan for using SIAs to strengthen routine immunization or the establishment and functioning of a coordinating committee with responsibility for this aspect of SIAs. One or more country-level process indicators would be adopted by countries to monitor progress on the activities that they have prioritized: for example, lasting improvement of certain health worker skills or frequency of routine immunization outreach to high risk communities identified through SIA planning.

High level political commitment and advocacy are needed to take advantage of the opportunities presented by SIAs to strengthen routine immunization and dedicate financial resources, even if at a modest level, for this expressed purpose. The cost of expanding the scope of SIA training to address identified skill deficiencies relevant to routine immunization is likely to be less than that of conducting a separate training. Similarly, at relatively low cost, SIA preparations and follow-up can be used to improve surveillance by increasing community awareness of target diseases and reinforcing the skills of health workers on procedures for reporting and responding to suspected cases of disease. These actions can help strengthen the delivery and use of vaccines that are already part of the national immunization program while laying the groundwork for the effective introduction of new vaccines. Development partners traditionally have not funded this aspect of SIAs. But limited additional investments in SIAs to strengthen routine

immunization could secure attention to and legitimize this component, achieve lasting improvements, and help harmonize SIAs with plans and priorities to improve routine immunization.

5. Conclusions

SIAs provide useful opportunities to strengthen routine immunization and it is to the mutual benefit of both measles elimination and routine immunization systems for these opportunities to be taken. However, impediments exist to realizing the potential of this synergy. These may be overcome or at least offset by recasting a “best practice SIA” as one that includes a component of strengthening routine immunization, bearing in mind the practical limits of what SIAs can do for routine immunization. We propose a practical, field-oriented approach with the following steps: (1) build political will and advocate for routine immunization strengthening as a standard part of a “best practice SIA” and for the resources to support this; (2) assign clear responsibilities for tasks related to this component before, during, and following the SIA; (3) select a small number of priority activities that address recognized needs in routine immunization; (4) plan and budget for this component such that it is integrated into both SIA and routine immunization planning; and (5) monitor progress and accountability both during and following the SIA. A sufficient planning horizon, financial and human resources, and serious political commitment and technical support are needed to transform the concept into action.

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Conflict of interest

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